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(54) Method and apparatus for fine motion estimation in digital video pictures

(57) The invention relates to a method for fine motion estimation in digital video signals. The vector search procedure is based on reconstructed $YCbCr$ pixel data received via a data bus (Z4) from the encoder prediction loop.

It is also proposed an architecture for an apparatus for fine motion estimation of digital video signals. In this architecture a feedback loop (390) for the block matching array (330) is included, which allows multiple use of the same data for the vector search procedure without accessing an external memory device (231) several times.

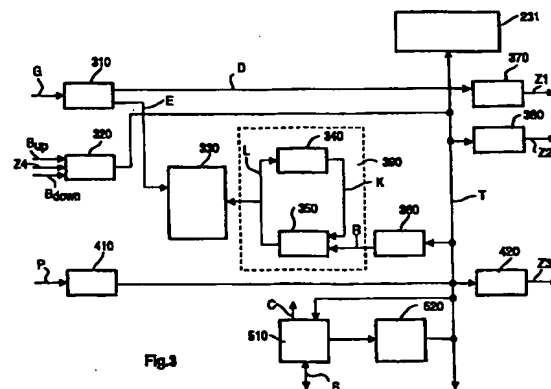


Fig. 3

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| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|---|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X | IEEE TRANSACTIONS ON SIGNAL PROCESSING, vol. 41, no. 2, 1 February 1993, pages 889-900, XP000346029 YEU-SHEN JEHNG ET AL: "AN EFFICIENT AND SIMPLE VLSI TREE ARCHITECTURE FOR MOTION ESTIMATION ALGORITHMS" * figures 1,3 * | 1,2 | H04N5/14 H04N7/36 |
| Y | IEEE TRANSACTIONS ON CONSUMER ELECTRONICS, vol. 40, no. 3, pages 234-241, XP000471179 JECHANG JEONG ET AL: "DEVELOPMENT OF AN EXPERIMENTAL FULL-DIGITAL HDTV SYSTEM: ALGORITHM AND IMPLEMENTATION" * figure 1 * | 1,2 | |
| Y | MULTIDIMENSIONAL SIGNAL PROCESSING, SAN FRANCISCO, MAR. 23 - 26, 1992, vol. 3, 23 March 1992, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, pages 465-468, XP000378969 SIU-LEONG IU: "COMPARISON OF MOTION COMPENSATION USING DIFFERENT DEGREES OF SUB- PIXEL ACCURACY FOR INTERFIELD/INTERFRAME HYBRID CODING OF HDTV IMAGE SEQUENCES" * figure 1 * | 1,2 | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| | | | H04N |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 16 May 1997 | Examiner Dippel, U |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document</p> | | | |

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EUROPEAN SEARCH REPORT

Application Number
EP 96 11 8864

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|---|---|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X | VISUAL COMMUNICATIONS AND IMAGE PROCESSING, vol. 1818, 18 - 20 November 1992, BELLINGHAM, WA, US, pages 1462-1474, XP000505403 XIAOBANG LEE: "A Fast Feature Matching Algorithm of Motion Compensation for Hierarchical Video CODEC" * page 1470, paragraph 3 * * figures 7,8 * | 1 | |
| A | --- | 2 | |
| X | EP 0 574 192 A (RCA THOMSON LICENSING CORP) 15 December 1993 * column 9, line 23 - line 55 * * figures 4A, 5D * | 3 | |
| A | --- | 6,7 | |
| A | EP 0 554 586 A (PHILIPS NV ;PHILIPS SPA (IT)) 11 August 1993 * column 2, line 52 - column 5, line 52 * * claims 2,3 * * figures 3,4 * | 3,6 | |
| A | SIGNAL PROCESSING IMAGE COMMUNICATION., vol. 6, no. 3, June 1994, AMSTERDAM NL, pages 229-239, XP000451927 GERARD DE HAAN: "Sub-pixel motion estimation with 3-D recursive search block-matching" * figure 3 * | 3,6,7 | |
| A | US 5 329 318 A (KEITH MICHAEL) 12 July 1994 * column 32, line 5 - column 34, line 7 * * figure 18 * | 3,6 | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 16 May 1997 | Examiner Dippel, U |
| CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document | | T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document | |

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